



Upward Flame Propagation and Wire Insulation Flammability

2006 Round Robin Data Analysis

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NASA/JAXA Technical Interchange Meeting
Tsukuba, Japan
June 4-8, 2007



Presentation Contributors



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Agenda



- Overview of statistical analysis
- NASA STD 6001 Test 1 Results
- NASA STD 6001 Test 4 Results
- Discussion



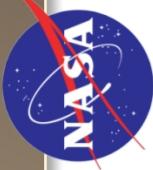
Overview of Statistics



- Focused on investigating data variability both within and between laboratories
- Evaluated the between-laboratory consistency through consistency statistic h , which indicates how one laboratory's cell average compares with averages from other labs



Overview of Statistics (continued)



- Evaluated the within-laboratory consistency through the consistency statistic k , which is an indicator of how one laboratory's within-laboratory variability compares with the variability of other labs combined
- Extreme results were tested to determine whether they resulted by chance or from nonrandom causes (human error, instrument calibration shift, non-adherence to procedures, etc.)



Test 1 Data Analysis



Kydex 100; 30% O₂ @ 10.2 psia Test Results (Burn Lengths, cm)

JAXA	MSFC	WSTF
5.5	3.8	5.3
4.7	3.8	5.8
5.7	3.3	5.1
5.7	5.1	5.3
20.3	3.8	5.6



Test 1 Data Analysis on Kydex



- Considering NASA STD 6001 pass/fail criteria, the labs provided inconsistent results. JAXA failed the material, while all other labs passed it
- Never-the-less, statistically there was no significant inconsistency among the average values obtained by any labs
- The critical k has not been exceeded, indicating that statistically the intra-laboratory variability was not great enough to cause concern for any of the labs



Test 1 Data Analysis on Kydex (continued)



- Statistically, two extreme data points (20.3 cm, JAXA; 5.1 cm, MSFC) could occur by chance within the respective data populations less than 5% of the time. There is a possibility for these data points to have resulted from nonrandom causes.
- **2000-2004 round robin history:**
 - With three exceptions, all labs passed this material under these conditions in the past.
 - Probability of a sample failing: 3.3%



Test 1 Data Analysis



Silicone, 20.9% O₂ @ 14.7 psia Test Results (Burn Lengths, cm)

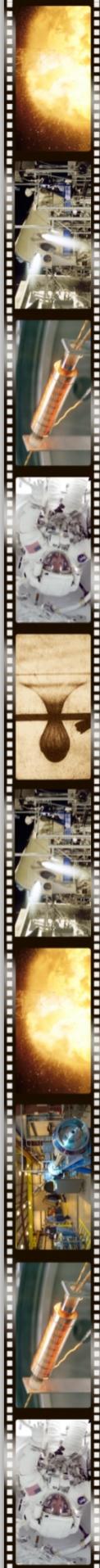
JAXA	MSFC	WSTF	KSC
11.5	7.9	9.1	7.6
13.0	10.2	9.1	10.2
14.1	7.9	9.9	10.2
12.4	10.7	12.4	10.2
11.5	7.4	11.7	10.2



Test 1 Data Analysis on Silicone



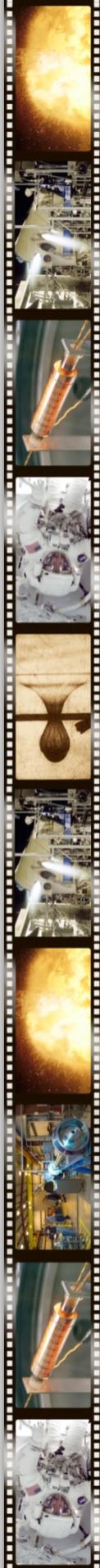
- Considering NASA STD 6001 pass/fail criteria, all labs provided consistent results
- The critical k has not been exceeded, indicating that statistically the intra-laboratory variability was not great enough to cause concern for any of the labs



Test 1 Data Analysis on Silicone (continued)



- Statistically, one extreme data point (7.6 cm, KSC) could occur by chance within the respective data populations less than 5% of the time. There is a possibility for this data point to have resulted from nonrandom causes.
- **2004 round robin history:** All labs passed this material under these conditions in the past.



Test 4 Data Analysis



M22759; 30% O₂ @ 10.2 psia Test Results (Burn Lengths, cm)

JAXA	MSFC	WSTF
14.0	12.4	28.4
15.4	6.1	29.7
5.9	16.0	24.6
13.0	18.5	3.8
15.3	17.0	18.3



Test 4 Data Analysis on M22759



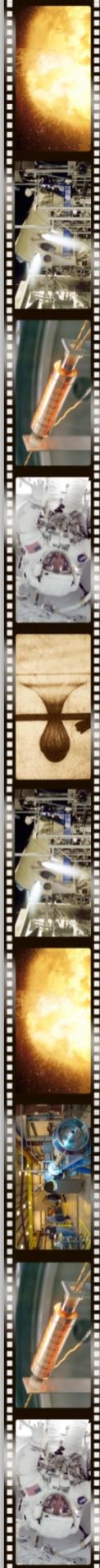
- Considering NASA STD 6001 pass/fail criteria, the labs provided consistent results.
- Statistically, there was no significant inconsistency among the average values obtained by the labs and the critical k has not been exceeded, indicating statistically the intra-laboratory variability was not significantly larger when compared with variability from all labs combined. However, the results obtained by WSTF are marginal with regard to intra-laboratory consistency.



Test 4 Data Analysis on M22759 (continued)



- Statistically, three data points (5.9 cm, JAXA; 6.1 cm, MSFC, and 3.8 cm, WSTF) could occur by chance within the respective data populations less than 5 % of the time. There is a possibility for these data points to have resulted from nonrandom causes.
- **1993-2004 round robin history:**
 - Probability of a sample passing: 34%
 - Probability of all samples passing: 10%
 - Probability of all samples failing: 33%
 - Probability of obtaining mixed results: 52%



Test 4 Data Analysis



M81044; 20.9% O₂ @ 14.7 psia Test Results (Burn Lengths, cm)

JAXA	MSFC	WSTF
9.6	6.9	6.9
9.6	8.9	7.6
4.2	9.9	7.6
4.4	14.0	4.6
7.4	10.7	6.4



Test 4 Data Analysis on M81044



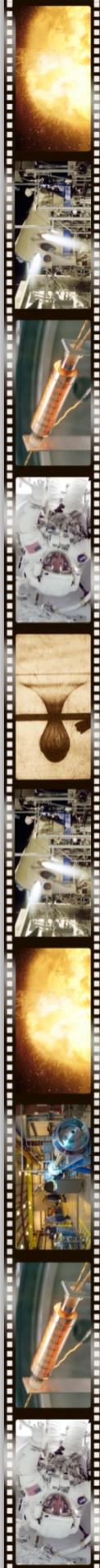
- Considering NASA STD 6001 pass/fail criteria, all labs provided consistent results.
- Statistically, there was no significant inconsistency among the average values obtained by the labs and the critical k has not been exceeded, indicating the intra-laboratory variability was not significantly larger when compared with variability from all labs combined. However, results obtained by MSFC are marginal with regard with intra-laboratory consistency.



Test 4 Data Analysis on M81044 (continued)



- Critical k has not been exceeded, indicating that statistically the intra-laboratory variability was not great enough to cause concern for any of the labs.
- Statistically, two extreme data points (14.0 cm, MSFC and 4.6 cm, WSTF) could occur by chance within the respective data populations, respectively, less than 5% of the time. There is a possibility for these data points to have resulted from nonrandom causes.



Test 4 Data Analysis on M81044 (continued)



- **1993-2004 round robin history:**

- With three exceptions, all labs passed this material under these conditions in the past.
- Probability of a sample failing: 2.8%

